SYSTEM AND METHOD FOR IDENTIFYING MANUFACTURED PARTS

TECHNICAL FIELD

[0001] The present disclosure relates to a system and method that can identify manufactured parts, and can optionally identify out-of-specification manufactured parts that have the same failure mechanism.

BACKGROUND

[0002] In a manufacturing environment, inspection systems can measure and store values of various physical properties of each manufactured part. Many of these inspection systems can flag a manufactured part as being out-of-specification if at least one of its physical properties is found to be outside a specified range, but cannot use the measurements of the physical properties to help diagnose why the part is out-of-specification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] In the drawings, which are not necessarily drawn to scale, like numerals may describe similar components in different views. Like numerals having different letter suffixes may represent different instances of similar components. The drawings illustrate generally, by way of example, but not by way of limitation, various examples discussed in the present document.

[0004] FIG. 1 is a block diagram showing the functional components of a system that can identify manufactured parts, in accordance with some embodiments.

[0005] FIG. 2 shows an example of a structure for test data for a plurality of manufactured parts, in accordance with some embodiments.

[0006] FIG. 3 shows an example of a normalization scheme for a particular set of measurements, in accordance with some embodiments.

[0007] FIG. 4 shows an example of a correlation scheme to compare two sets of normalized measurements, in accordance with some embodiments.

[0008] FIG. 5 shows an example of a portion of computer code, which can perform a correlation calculation, in accordance with some embodiments.

[0009] FIG. 6 shows an example of a user interface, in accordance with some embodiments.

[0010] FIG. 7 shows an example of a method for identifying manufactured parts, in accordance with some examples.

DETAILED DESCRIPTION

[0011] A system and method can identify manufactured parts. A user can select a particular manufactured part, which can be out-of-specification. The system can retrieve test data for the selected part and for other manufactured parts. The system can normalize the retrieved test data against historical means and historical standard deviations to form normalized test data. The system can correlate the normalized test data for the selected part against normalized test data for each of the other manufactured parts to form correlation values. The system can display the correlation values with identifiers corresponding to the manufactured parts. Each correlation value can represent a degree of similarity between the selected part and a respective manufactured part. The manufactured parts with the highest correlation values can have the same failure mechanism as the selected part, which can help diagnose why the selected part can be out-of-specification.

[0012] As a specific example, consider a manufactured item in which a screw connects two elements. Under normal manufacturing conditions, the screw is tightened to a torque within a specified range. In one example of a failure mode, the screw can be over-tightened during the assembly process, which can distort the attached elements in the vicinity of the screw. An inspection system may be able to detect such a distortion, such as in a thickness measurement taken close to the over-tightened screw, and can flag the item as being out-of-specification for having too small a thickness in the detected area.

[0013] In some examples, the system and method discussed in detail below can be used to help diagnose an underlying cause of why a flagged item is out-of-specification. The system and method can identify multiple parts having the same failure mechanism. An operator can use information from the identified parts to help diagnose the underlying cause of the manufacturing errors. For instance, the system and method can identify that the screw over-tightening errors occur on parts assembled on Wednesdays, and an operator can use that knowledge to locate an erroneous torque value in a configuration file that is updated on Tuesday nights. This is but one example; the system and method can help diagnose other issues as well. In other examples, the system and method discussed in detail below can be used to help diagnose issues with parts that are within specification.

[0014] The preceding paragraphs are but a summary of one example of a suitable system method that can identify manufactured parts, and are not intended to be limiting in any way. Other suitable examples are described in detail below.

[0015] FIG. 1 is a block diagram showing the functional components of a system 100 that can identify manufactured parts, in accordance with some embodiments. In some examples, system 100 can be a manufacturing line measurement system, which can take and log measurements of various physical properties of each manufactured part. In some examples, system 100 can include a server configured to store test data for a plurality of manufactured parts. The plurality of manufactured parts can have the same nominal physical properties and differ from one another due to manufacturing imperfections. The test data can include a plurality of numerical values for each manufactured part. The system 100 is but one example; other suitable systems can also be used.

[0016] As shown in FIG. 1, a front end may comprise a user interface module (e.g., a web server) 102, which receives requests from various client-computing devices, and communicates appropriate responses to the requesting client devices. For example, the user interface module(s) 102 may receive requests in the form of Hypertext Transport Protocol (HTTP) requests, or other network-based, application programming interface (API) requests (e.g., from a dedicated social networking service application running on a client device).

[0017] User interface module 102 can provide a user interface to a user. The user interface can include user interface elements to allow for selections from the user. For instance, the user interface can include one or more boxes that accept input from a user, one or more selectable boxes